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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,484	10/20/2003	Neal S. Bergano	TCM137CON2	7912
7590 06/15/2006 Grossman, Tucker, Perreault & Pfleger, PLLC 55 South Commercial Street Manchester, NH 03101			EXAMINER WANG, QUAN ZHEN	
			ART UNIT 2613	PAPER NUMBER

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/689,484	Applicant(s) BERGANO, NEAL S.	
	Examiner Quan-Zhen Wang	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 45-141 is/are pending in the application.
- 4a) Of the above claim(s) 140 and 141 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 45-139 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/20/03, 1/7/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 45-139, drawn to transmitting apparatus with hybrid modulation, classified in class 398, subclass 185.
 - II. Claims 140-141, drawn to an optical signal modulation method which modulates optical signals with values being less than a value representing one and greater a value representing zero, classified in class 398, subclass 186.
2. Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the Invention II can be used to modulate optical signals without using the hybrid modulation of Invention I.
3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

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4. Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Donald J. Perreault on May 12, 2006 a provisional election was made without traverse to prosecute the invention of Group I, claims 45-139. Affirmation of this election must be made by applicant in replying to this Office action. Claims 140 and 141 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 45-47, 49, 51-53, 56-57, 60-63, 73-78, 81-82, 85-88, 95-96, 99-100, 131-132, and 135-138 are rejected under 35 U.S.C. 102(e) as being anticipated by Taga et al. (U.S. Patent US 5,872,647).

Regarding claims 45, 73, 95, and 131, Taga discloses an apparatus for transmitting an optical signal comprising: an optical signal source (fig. 1, light source 1)

configured to generate an optical signal; a data modulator (fig. 1, data modulator 3) coupled to the optical signal source and configured to modulate data on the optical signal at a data modulation frequency; an amplitude modulator (fig. 1, modulator 2) coupled to the optical signal source and configured to modulate the intensity of the optical signal at an amplitude modulation frequency phase locked to the data modulation frequency (column 2, line 49-column 3, line 8).

Regarding claims 46, 74, 96, and 132, Taga further teaches that the amplitude modulation frequency is equal to the data modulation frequency (fig. 2B and 2C).

Regarding claims 47 and 75, Taga further teaches that the data modulation frequency is provided by a clock (fig. 1, clock extraction unit 5) coupled to the amplitude modulator.

Regarding claim 49, Taga further teaches that the optical signal source includes a continuous-wave optical signal generator (fig. 2A), wherein the data is provided to the data modulator by a data source (fig. 1 data source coupled to d) coupled to the data modulator, and wherein the apparatus further comprises a clock (clock carried by the data) for establishing the data modulation frequency.

Regarding claims 51 and 76, Taga further teaches that the amplitude modulator modulates the amplitude of the optical signal at the data modulation frequency with a prescribed phase (fig. 1, phase adjusting unit 6):

Regarding claims 52-53, and 77-78, Taga further teaches that the system further comprising a clock for establishing the data modulation frequency and an electrical variable-delay line (fig. 1, phase adjusting unit 6) coupling the clock to the amplitude

modulator for selectively varying the prescribed phase; and the electrical variable-delay line is a phase shifter.

Regarding claims 56, 81, and 100, Taga further teaches that system further comprising a polarization modulator (polarization scrambler 4) coupled to the data modulator for modulating the state of polarization of the optical signal at the data modulation frequency such that an average value of the state of polarization over a modulation cycle is substantially equal to zero.

Regarding claims 57 and 82, Taga further teaches that the apparatus further comprising a clock for establishing the data modulation frequency (fig. 1, clock unit 7), the clock being coupled to the polarization modulator.

Regarding claims 60 and 85, Taga further teaches that the amplitude modulator modulates the amplitude of the optical signal at the data modulation frequency with a prescribed phase (fig. 1, phase adjusting unit 8).

Regarding claims 61, 86, and 99, Taga further teaches that the system further comprising an electrical variable-delay line (fig. 1, phase adjusting unit 8) coupled to the polarization modulator for selectively varying the prescribed phase.

Regarding claims 62-63 and 87-88, Taga further teaches that the system further comprising a clock for establishing the data modulation frequency and an electrical variable-delay line (fig. 1, phase adjusting unit 8) coupling the clock to the polarization modulator for selectively varying the prescribed phase; and the electrical variable-delay line is a phase shifter.

Regarding claim 135-136, Taga further teaches that the amplitude modulation means comprises a data source coupled to the data modulator and provide an electrical waveform data (fig. 1).

Regarding claim 137, Taga further teaches that the amplitude modulation is coupled to the optical signal source (fig. 1).

Regarding claim 138, Taga further teaches that the amplitude modulation means is configured to provide an electrical waveform to the optical signal source for modulating the amplitude of the optical signal (fig. 1).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 50, 54-55, 59, 79-80, 84, 97, and 139 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taga et al. (U.S. Patent US 5,872,647).

Regarding claims 50 and 139, Taga differs from the claimed invention in that Taga does not specifically teach that the optical signal generator comprises a laser. However, the Examiner takes Official Notice that it is well known in the art to include a laser in a light source of an optical transmitter. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to include a

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laser in the light source of Taga in order to generate strong optical signals at a given wavelength.

Regarding claims 54-55, 79-80, and 97, Taga differs from the claimed invention in that Taga does not specifically teach that the amplitude modulator includes means for selectively adjusting the degree of intensity modulation that is imparted to the optical signal. However, the Examiner takes Official Notice that it is well known in the art to adjust the degree of intensity modulation that is imparted to an optical signal.

Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to include means for selectively adjusting the degree of intensity modulation that is imparted to the optical signal in the system of Taga in order to adjust the duty cycle the modulated signals.

Regarding claims 59 and 84, Taga differs from the claimed invention in that Taga does not specifically teach that the polarization modulator modulates the state of polarization by tracing the polarization of the optical signal along at least a portion of a Poincare sphere. However, the Examiner takes Official Notice that it is well known in the art to modulate the state of polarization by tracing the polarization of an optical signal along at least a portion of a Poincare sphere. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to modulate the state of polarization by tracing the polarization of an optical signal along at least a portion of a Poincare sphere in the apparatus of Taga in order to generate polarization independent modulated optical signals.

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10. Claims 58, 83, 98, and 133-134 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taga et al. (U.S. Patent US 5,872,647) in view of Takayama et al. (K. Takayama et al., "An all-optical 10-GHz LD-based clock regenerator using a Mach-Zehnder interferometer-type NRZ-RZ converter", *Tech digest of ECOC '91*, vol. MoC1-2, pp. 77-80, September 1991).

Regarding claims 58, 83, 98, and 133-134, Taga discloses the claimed invention except that Taga does not specifically teach that the polarization modulator is coupled to the data modulator through the amplitude modulator. However, it is well known in the art to use an amplitude modulator following a data modulator. For example, Takayama discloses that the amplitude modulator (fig. 1, Mach-Zehnder interferometer) is arranged to follow the data modulator (not shown in the figure). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to arrange the amplitude modulator following the data modulator in the system of Taga and, therefore, the polarization modulator is coupled to the data modulator through the amplitude modulator. One ordinary skill in the art would be motivated to do so in order to generate RZ signals from NRZ signals.

11. Claims 64, 66-69, 71-72, 89, 91-94, and 101-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taga et al. (U.S. Patent US 5,872,647) in view of Kitajima et al. (U.S. Patent US 5,515,196)

Regarding claims 64, 89, and 101, Taga differs from the claimed invention in that Taga does not specifically teach that the system further comprises a phase modulator

coupled to the data modulator, the phase modulator configured to provide optical phase modulation to the optical signal. However, it is well known in the art to include a phase modulator in an optical transmitter to modulate the phase of the optical signal to be transmitted. For example, Kitajima discloses an optical transmitter apparatus comprising a phase modulator in an optical transmitter to modulate the phase of the optical signal to be transmitted (fig. 13). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a phase modulator, as it is taught by Kitajima, in the optical transmitter apparatus of Taga to modulate the phase of the optical signal to be transmitted in order to reduce the time jitter of the optical signal caused by the influence of dispersion.

Regarding claims 66 and 91, Kitajima further teaches that the apparatus further comprising a clock for establishing the data modulation frequency, and wherein the clock is coupled to the phase modulator so that the phase modulator provides optical phase modulation at a frequency that is phase locked and equal to the data modulation frequency (fig. 13).

Regarding claims 67-69, 71, and 92-93, the modified system of the modified system of Taga and Kitajima differs from the claimed invention in that Taga and Kitajima do not specifically disclose that the apparatus further comprising an electrical variable-delay line coupling the clock to the phase modulator for selectively varying the phase of the optical phase modulation provided by the phase modulator, and the electrical variable-delay line is a phase shifter, and the phase modulator provides phase modulation at a frequency that is phase locked and equal to the data modulation.

However, Taga discloses an electrical variable-delay line coupling the clock to the amplitude modulator for selectively varying the phase of the optical phase modulation provided by the phase modulator, and the electrical variable-delay line is a phase shifter. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate an electrical variable-delay line coupling the clock to the phase modulator for selectively varying the phase of the optical phase modulation provided by the phase modulator, and the electrical variable-delay line is a phase shifter, and the phase modulator provides phase modulation at a frequency that is phase locked and equal to the data modulation in order to synchronize the data modulation and the phase modulation.

Regarding claims 72, 94, and 102, Taga further teaches that the amplitude modulator is driven by a sinusoidal signal to modulate the intensity of the optical signal (column 2, lines 52-56).

12. Claims 65, 70, and 90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taga et al. (U.S. Patent US 5,872,647) in view of Kitajima et al. (U.S. Patent US 5,515,196) and further in view of Takayama et al. (K. Takayama et al., "An all-optical 10-GHz LD-based clock regenerator using a Mach-Zehnder interferometer-type NRZ-RZ converter", *Tech digest of ECOC '91*, vol. MoC1-2, pp. 77-80, September 1991).

Regarding claims 65, 70, and 90, the modified system of Taga and Kitajima discloses the claimed invention except that Taga and Kitajima do not specifically teach

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that the polarization modulator is coupled to the data modulator through the amplitude modulator. However, it is well known in the art to use an amplitude modulator following a data modulator. For example, Takayama discloses that the amplitude modulator (fig. 1, Mach-Zehnder interferometer) is arranged to follow the data modulator (not shown in the figure). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to arrange the amplitude modulator following the data modulator in the modified system of Taga and Kitajima, and, therefore, the polarization modulator is coupled to the data modulator through the amplitude modulator. One ordinary skill in the art would be motivated to do so in order to generate RZ signals from NRZ signals.

13. Claims 103-104, 108-109, 111-115, 119-121, 125-127, and 130 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitajima et al. (U.S. Patent US 5,515,196) in view of Taga et al. (U.S. Patent US 5,872,647).

Regarding claim 103, Kitajima discloses a transmission system comprising: a transmitter, an optical transmission path coupled to the transmitter; and a receiver coupled to the optical transmission path (fig. 11). Kitajima differs from the claimed invention in that Kitajima does not specifically disclose that the transmitter including: an optical signal source for generating an optical signal; a data modulator coupled to the optical signal source for modulating data at a data modulation frequency; an amplitude modulator coupled to the optical signal source for modulating the intensity of the optical signal; a clock coupled to the amplitude modulator having a frequency that determines

the frequency of the amplitude modulator, the frequency of the clock being phase locked to the data modulation frequency. However, such a transmitter is well known in the art. For example, Taga discloses a transmitter including: an optical signal source (fig. 1, light source 1) for generating an optical signal; a data modulator (fig. 1, data modulator 3) coupled to the optical signal source for modulating data at a data modulation frequency; an amplitude modulator (fig. 1, modulator 2) coupled to the optical signal source for modulating the intensity of the optical signal; a clock (fig. 1, clock unit 5) coupled to the amplitude modulator having a frequency that determines the frequency of the amplitude modulator, the frequency of the clock being phase locked to the data modulation frequency (figs. 2B and 2C). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a transmitter, such as the one taught by Taga, in the system of Kitajima in order to increase the margin of the high-speed electro-optic polarization scrambler phase adjustment.

Regarding claim 104, Taga further teaches that the frequency of the clock is equal to the data modulation frequency (figs. 2B and 2C).

Regarding claim 108, Taga further teaches that system further comprising a polarization modulator (polarization scrambler 4) coupled to the data modulator for modulating the state of polarization of the optical signal at the data modulation frequency such that an average value of the state of polarization over a modulation cycle is substantially equal to zero.

Regarding claim 109, Taga further teaches that the apparatus further comprising a clock for establishing the data modulation frequency (fig. 1, clock unit 7), the clock being coupled to the polarization modulator.

Regarding claim 111, Kitajima and Taga differ from the claimed invention in that Kitajima and Taga do not specifically teach that the polarization modulator modulates the state of polarization by tracing the polarization of the optical signal along at least a portion of a Poincare sphere. However, the Examiner takes Official Notice that it is well known in the art to modulate the state of polarization by tracing the polarization of an optical signal along at least a portion of a Poincare sphere. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to modulate the state of polarization by tracing the polarization of an optical signal along at least a portion of a Poincare sphere in the apparatus of Kitajima and Taga in order to generate polarization independent modulated optical signals.

Regarding claim 112, Taga further teaches that the amplitude modulator modulates the amplitude of the optical signal at the data modulation frequency with a prescribed phase (fig. 1, phase adjusting unit 8).

Regarding claim 113, Taga further teaches that the system further comprising an electrical variable-delay line (fig. 1, phase adjusting unit 8) coupled to the polarization modulator for selectively varying the prescribed phase.

Regarding claims 114-115, Taga further teaches that the system further comprising a clock for establishing the data modulation frequency and an electrical variable-delay line (fig. 1, phase adjusting unit 8) coupling the clock to the polarization

modulator for selectively varying the prescribed phase; and the electrical variable-delay line is a phase shifter.

Regarding claim 119, Kitajima further discloses an optical transmitter apparatus comprising a phase modulator in an optical transmitter to modulate the phase of the optical signal to be transmitted (fig. 13).

Regarding claim 120, Kitajima further discloses that the phase modulator follows the data modulator, and therefore, the amplitude modulator is coupled to the data modulator through the phase modulator.

Regarding claim 121, Kitajima further discloses that the optical phase modulator provides optical phase modulation to the optical signal while imparting substantially no polarization modulation thereto (fig. 13).

Regarding claim 125, Kitajima further teaches that the apparatus further comprising a clock for establishing the data modulation frequency, and wherein the clock is coupled to the phase modulator so that the phase modulator provides optical phase modulation at a frequency that is phase locked and equal to the data modulation frequency (fig. 13).

Regarding claims 126-127, the modified system of the modified system of Kitajima and Taga differs from the claimed invention in that Kitajima and Taga do not specifically disclose that the apparatus further comprising an electrical variable-delay line coupling the clock to the phase modulator for selectively varying the phase of the optical phase modulation provided by the phase modulator, and the electrical variable-delay line is a phase shifter, and the phase modulator provides phase modulation at a

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frequency that is phase locked and equal to the data modulation. However, Taga discloses an electrical variable-delay line coupling the clock to the amplitude modulator for selectively varying the phase of the optical phase modulation provided by the phase modulator, and the electrical variable-delay line is a phase shifter. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate an electrical variable-delay line coupling the clock to the phase modulator for selectively varying the phase of the optical phase modulation provided by the phase modulator, and the electrical variable-delay line is a phase shifter, and the phase modulator provides phase modulation at a frequency that is phase locked and equal to the data modulation in order to synchronize the data modulation and the phase modulation.

Regarding claim 130, Taga further teaches that the amplitude modulator is driven by a sinusoidal signal to modulate the intensity of the optical signal (column 2, lines 52-56).

14. Claim 110 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitajima et al. (U.S. Patent US 5,515,196) in view of Taga et al. (U.S. Patent US 5,872,647) and further in view of Takayama et al. (K. Takayama et al., "An all-optical 10-GHz LD-based clock regenerator using a Mach-Zehnder interferometer-type NRZ-RZ converter", *Tech digest of ECOC '91*, vol. MoC1-2, pp. 77-80, September 1991).

Regarding claim 110, Kitajima and Taga disclose the claimed invention except that Kitajima and Taga do not specifically teach that the polarization modulator is

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coupled to the data modulator through the amplitude modulator. However, it is well known in the art to use an amplitude modulator following a data modulator. For example, Takayama discloses that the amplitude modulator (fig. 1, Mach-Zehnder interferometer) is arranged to follow the data modulator (not shown in the figure). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to arrange the amplitude modulator following the data modulator in the modified system of Kitajima and Taga, and, therefore, the polarization modulator is coupled to the data modulator through the amplitude modulator. One ordinary skill in the art would be motivated to do so in order to generate RZ signals from NRZ signals.

15. Claims 105-107, 116-118, 122-124, and 128-129 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitajima et al. (U.S. Patent US 5,515,196) in view of Taga et al. (U.S. Patent US 5,872,647) and further in view of Fontana et al. (U.S. Patent US 5,910,852).

Regarding claims 105, 116, and 122, Kitajima and Taga have been discussed above in regard with claim 103. The modified system of Kitajima and Taga comprising means for transmitting a predetermined characteristic to the transmitter and means for selectively varying the amplitude modulation imparted to the optical signal to optimize the value of the predetermined characteristic (fig. 1). Kitajima and Taga differ from the claimed invention in that Kitajima and Taga do not specifically teach that the system comprising means for measuring a predetermined characteristic of an optical signal

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received by the receiver. However, it is well known in the art to include means for measuring a predetermined characteristic of an optical signal received by the receiver. For example, Fontana discloses means for measuring a predetermined characteristic of an optical signal received by the receiver (fig. 1, analyzer 45; column 2, lines 48-63). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate means for measuring a predetermined characteristic, as it is disclosed by Fontana, in the modified system of Kitajima and Taga in order to measure quality of the transmitted optical signal.

Regarding claims 106-107, Taga further teaches selectively varying the phase of the amplitude modulation and selectively varying the amount of the amplitude modulation (fig. 1).

Regarding claims 117-118, 123-124 and 128-129, Fontana further teaches that the predetermined characteristic is signal to noise ratio (column 2, lines 48-63) and the Q-factor can be deduced from the SNR.

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

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F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 45-139 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 5,946,119. The following table summarizes the correspondence of claims between the application and the patent:

The Instant Application	Patent 5,946,119
Claims 45-54, 73-78, 95-98, 131-139	Claims 1-3
Claims 54-55, 79-80, and 97	Claims 2,4
Claims 56-59, 60-62, 81-88 and 99-100	Claims 6-8, and 12
Claims 62-63, and 87-88	Claims 5, and 12-13
Claims 64-72, 89-94, and 101-102	Claims 10-15
Claims 45, 64-73, 89-95, and 101-102	Claims 22-25
Claims 103-130	Claims 1-8, 22-25
Claims 117-118, 123-124 and 128-129	Claims 14-15, and 19

Although the conflicting claims are not identical, they are not patentably distinct from each other because claims in the continuation are broader than the patented claims, *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982) and *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993), broad claims in the instant application are rejected as obvious double patenting over narrow claims of copending Application.

For example, claim 1 of the present invention does not claim the specific features of “a clock coupled to said amplitude modulator and said data modulator, said clock having a frequency that determines the modulation frequency of the amplitude modulator, said frequency of the clock being phase locked and equal to said predetermined frequency”.

Therefore, claim 1 of the instant invention is broader than claim 1 of the copending Application.

18. Claims 45-139 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-49 of U.S. Patent No. 6,556,326

B2. The following table summarizes the correspondence of claims between the application and the patent:

The Instant Application	Patent 6,556,326 B2
Claims 45-54, 73-78, 95-98, 131-139	Claims 1-5, 19-22, and 49
Claims 54-55, 79-80, and 97	Claims 3, 5, and 22-25
Claims 56-59, 60-62, 81-88 and 99-100	Claims 6-9
Claims 62-63, and 87-88	Claims 8-9, and 28-29
Claims 64-72, 89-94, and 101-102	Claims 10-13, and 26-29
Claims 45, 64-73, 89-95, and 101-102	Claims 19-35
Claims 103-130	Claims 1-5, and 36-48
Claims 117-118, 123-124 and 128-129	Claims 46-47

Although the conflicting claims are not identical, they are not patentably distinct from each other because claims in the continuation are broader than the patented claims. In *re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982) and *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993), broad claims in the instant application

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are rejected as obvious double patenting over narrow claims of copending Application. For example, claim 1 of the present invention does not claim the specific features of "a clock coupled to said amplitude modulator and said data modulator, said clock having a frequency that determines the modulation frequency of the amplitude modulator, said frequency of the clock being phase locked and equal to said predetermined frequency". Therefore, claim 1 of the instant invention is broader than claim 1 of the copending Application.

19. Claims 45-139 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 6,744,992

B2. The following table summarizes the correspondence of claims between the application and the patent:

The Instant Application	Patent 6,744,992 B2
Claims 45-54, 73-78, 95-98, 131-139	Claims 1-6, 14, 15 and 16
Claims 54-55, 79-80, and 97	Claims 1-6, 14, 15 and 16
Claims 56-59, 60-62, 81-88 and 99-100	Claims 7-9
Claims 62-63, and 87-88	Claims 10
Claims 64-72, 89-94, and 101-102	Claims 11-13
Claims 45, 64-73, 89-95, and 101-102	Claims 19
Claims 103-130	Claim 17, 19, 20
Claims 117-118, 123-124 and 128-129	Claim 17, 19, 20

Although the conflicting claims are not identical, they are not patentably distinct from each other because claims in the continuation are broader than the patented claims, In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982) and In re Goodman, 11

F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993), broad claims in the instant application are rejected as obvious double patenting over narrow claims of copending Application. For example, claim 1 of the present invention does not claim the specific features of “a clock coupled to said amplitude modulator and said data modulator, said clock having a frequency that determines the modulation frequency of the amplitude modulator, said frequency of the clock being phase locked and equal to said predetermined frequency”. Therefore, claim 1 of the instant invention is broader than claim 1 of the copending Application.

Allowable Subject Matter

20. Claim 48 would be allowable if rewritten or amended to overcome the double patenting rejection(s) set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: claim 48 is allowable since the prior art of record does not teach or suggest in combination to couple the clock which is coupled to the amplitude modulator to the data modulator, in addition to other limitations cited in the claim.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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